

# Flightfax

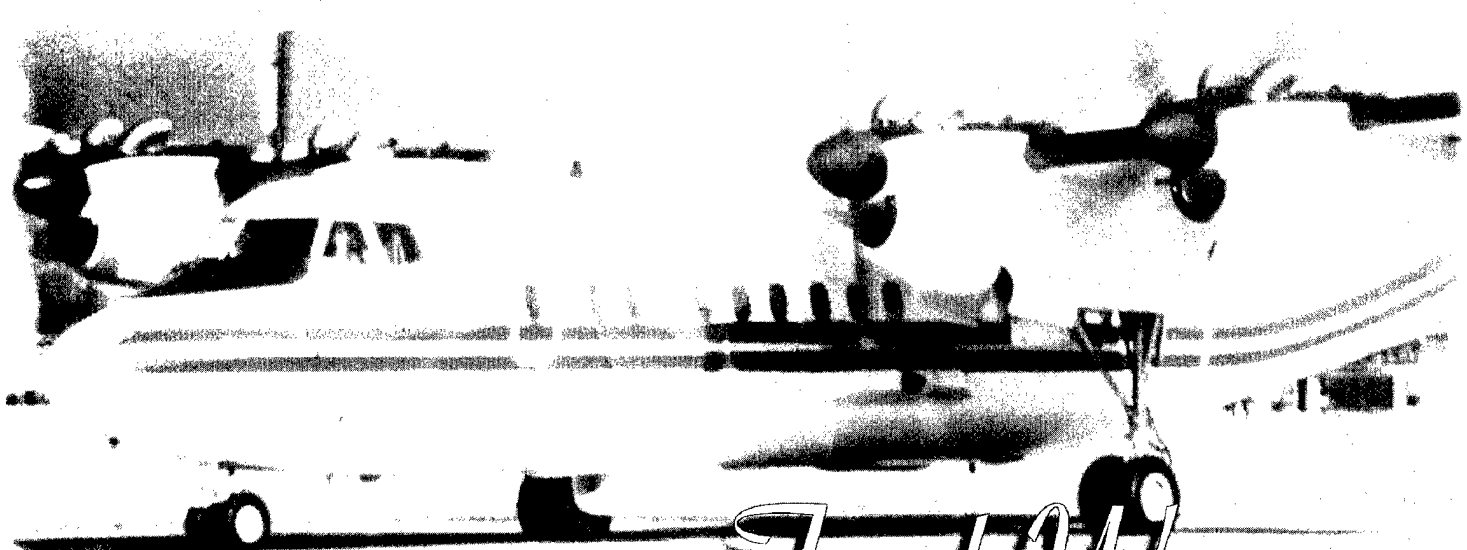
ARMY AVIATION  
RISK-MANAGEMENT  
INFORMATION

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*Fixed-Wing*  
**ACCIDENTS:**  
then and now

# FIXED-WING ACCIDENTS: then and now

In 1995, CW4 Al Rice analyzed Army fixed-wing Class A-C accidents that occurred from 1 January 1984 to 24 March 1994. For the selected time period, Mr. Rice analyzed data from the United States Army Safety Center (USASC) database and determined that—

- 41 percent of the accidents were caused by human error.

- 31 percent were caused by materiel failures or malfunctions.

- 28 percent were caused by environmental factors.

To see if the trend was changing, I recently analyzed data for a subsequent 5-year period. I analyzed 59 Class A-C fixed-wing aircraft mishaps that occurred between March 1995 and March 1999 and found that—

- 47.5 percent of the accidents were caused by environmental factors, (present in 28 of the 59 accidents analyzed).

- Lightning strikes accounted for 21 of the 28 environmental-factor accidents. Lightning strikes appear to be prevalent in aircraft equipped with weather radar and storm scopes. However, some pilots may have a false sense of security or may not have received adequate training in using the equipment. Some lightning strikes may be completely unavoidable.

- Other environmental factors contributing to accidents include bird strikes, deer strikes, and ice-related mishaps.

- 39 percent of the accidents were a result of human error.

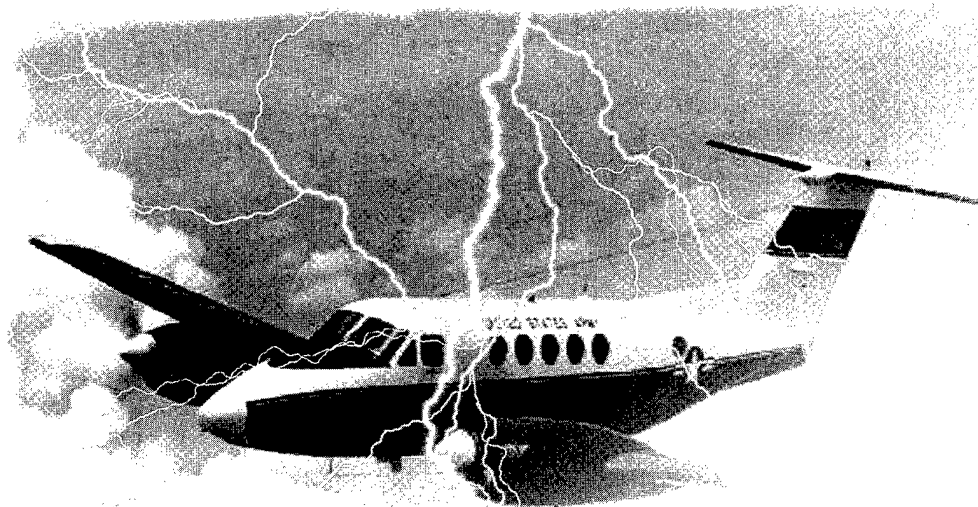
- Analysis of the human error accidents from both studies revealed that there are still accidents due to poor landing and takeoff techniques. Poor landings and takeoffs resulted from a combination of environmental factors, fixation, pilot experience, effect of winds, improper power management, improper planning, and pilot overconfidence.

- Other human errors involved hitting objects—such as fire extinguishers—while

taxiing and not properly closing aircraft doors.

- When comparing the two sets of data, I found nothing substantially different than Mr. Rice found. The types of human error and environmental factors accidents are basically the same as in 1995 which, by default, makes his corrective actions as appropriate today as they were a few years ago.

- Effective aircrew coordination will assist in eliminating human error accidents. The proper use of basic aircrew coordination techniques—such as crewmembers monitoring each other, prioritization of tasks, and distribution of workload—will increase crew situational awareness and thus



reduce human error mishaps.

■ Thorough post-flight briefings are critical to ensuring that problems which occurred during the flight can be identified and briefed to the other aircrew members in the organization, thus reducing the possibility of similar situations arising during subsequent flights.

■ Proper use of the checklist will prevent mishaps.

■ Disciplined compliance

with outlined procedures in standards such as Army regulations, Operator's Manuals, Aircrew Training Manuals, Training Circulars, Field Circulars and Approach Plates will also reduce mishaps. Deviations from standard procedures make aircrews more susceptible to mishap scenarios.

Fixed-wing aircraft continue to have the lowest Class A accident rates in the Army

due to the efforts of the crewmembers and all the support personnel. Keep up the good work. Continue to maintain vigilance and the trend in human error mishaps will continue downward.

—Gary D. Braman, Fixed-Wing/Cargo Aircraft and TUAV System Safety Manager, United States Army Safety Center, DSN 558-2676 commercial (334) 255-2676, e-mail: [bramang@safetycenter.army.mil](mailto:bramang@safetycenter.army.mil).

CW4 Rice is currently the Aviation Safety Officer at ARCENT and portions of his research were used with his permission.

## We need your Lessons Learned!

**S**afety Professionals...we need your help! As you identify lessons learned, please use one of the media avenues described below to get the information out to the field. It may be the difference between a life saved – and one lost. "Lessons learned" can keep people from "reinventing the wheel" or making mistakes that someone else has already made. Your input is vital to an effective Accident Prevention Program.

### WHAT TOOLS ARE AVAILABLE TO HELP YOU GET THE WORD OUT?

■ **RMIS** – The Risk Management Information System is a powerful risk management and research tool aimed at helping meet Department of Defense and Army goals for accident prevention. It is a worldwide Internet-based risk management tool designed to help leaders and their staffs make informed decisions to do tough missions safely. The web site for RMIS is <http://rmis.army.mil>. Please send your Lessons Learned to Dwight Lindsey, RMIS Administrator [Lindseyd@safetycenter.army.mil](mailto:Lindseyd@safetycenter.army.mil).

■ **ASO/CP12 LISTSERVERs** – This is a quick way to get information out to the field. Send email to Dr. Brenda Miller [MillerB@safetycenter.army.mil](mailto:MillerB@safetycenter.army.mil), CW3(P) Darrel Smith [SmithD@safetycenter.army.mil](mailto:SmithD@safetycenter.army.mil), or Mr. Lee Helbig [HelbigC@safetycenter.army.mil](mailto:HelbigC@safetycenter.army.mil) with

the information you want disseminated. If you are a subscriber to these listservers, you can post the information directly.

■ **COUNTERMEASURE** – This publication is focused on "Ground" Accident Prevention – to include Army motor vehicles (track & wheeled), POV, munitions, fire protection, seasonal articles, recreation and athletics (all Army operations other than aviation). Countermeasure is published monthly with a circulation of 35,000 copies and is also posted to the Army Safety Center web site. Distributed down to unit level, its primary audience includes first-line leaders of soldiers and its secondary audience is commanders. Send your lessons learned or ground-related articles to Ms. Paula Allman, Managing Editor [AllmanP@safetycenter.army.mil](mailto:AllmanP@safetycenter.army.mil) or [countermeasure@safetycenter.army.mil](mailto:countermeasure@safetycenter.army.mil).

■ **FLIGHTFAX** – This publication is designed for "Aviation" Accident Prevention. Flightfax is published monthly with a circulation of 18,000 copies and is also posted to the Safety Center web site. Distributed down to unit level, its primary audience is aviation safety officers and operational pilots, and its secondary audience is aviation commanders and maintenance personnel.

Send your lessons learned or articles to Ms. Judy Wilson, Managing Editor [WilsonJ@safetycenter.army.mil](mailto:WilsonJ@safetycenter.army.mil) or

flightfax@safetycenter.army.mil.

■ **Center for Army Lessons Learned** – The Center for Army Lessons Learned [CALL] provides a forum for lessons learned. The CALL Publications are distributed in both paper and electronic copy. The intent is to share knowledge, support discussion and impart lessons and information in an expeditious manner. The CALL publication

is not a doctrinal product and is not intended to serve as a program to guide the conduct of operations and training. The information and lessons are not staffed, but are the perceptions of those individuals involved in military exercises, activities and real-world events. If you have articles and lessons of interest to the Total Force, please contact the Managing Editor, Dr. Lon R. Seglie,

Segliel@Leavenworth.army.mil. You can visit the CALL website at <http://call.army.mil>.

If possible, articles should be submitted in either Word Perfect or Word format. Graphs, slides and clip art should be submitted separately from the document in either ppt, pcx or wpg format.

—Dr. Brenda Miller, Ch. Training and Education Division U.S. ARMY SAFETY CENTER, DSN 558-3553 or CML 334-255-3553 [millerb@safetycenter.army.mil](mailto:millerb@safetycenter.army.mil)

## “Did You See That Tower?”

**H**ow many times have you said this in your career in the cockpit? As an aviator with eleven years of experience I believe it is fair to assess that many of us have experienced a near-miss with an object that seemingly should have been lighted and annotated in our flight information publications but was not.

On several occasions I have flown past cell phone towers and wires that were either not lighted or not annotated in flight information publications. *They should have been, shouldn't they?* I decided to find out more about this, becoming the subject matter expert on how obstructions are reported through appropriate channels and ultimately make their way into flight information publications and tactical maps.

### RESEARCH

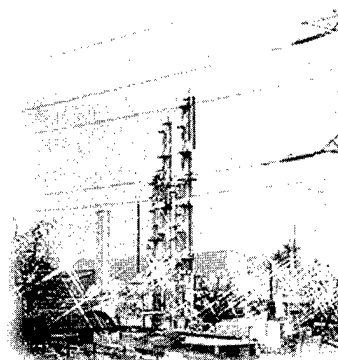
The federal government controls reporting, marking, and lighting of obstructions in the National Airspace System. Federal Aviation Regulation (FAR) 14 Code of Federal Regulation (CFR) Part 77 states that all obstructions more than 200' above ground level (AGL) will be reported. Obstructions less than 200' AGL do not have to be reported *unless*, according to Advisory Circular (AC) 70/7460-1K, dated 1 Mar 00, the *FAA recommends* marking and/or

lighting such a structure because of its particular location. 14 CFR part 77 and AC 70/7460-1K basically state that obstructions within 20,000 feet of a runway, regardless of height, will be reported to the FAA. This allows an appropriate safety survey of its location and potential hazard to the National Airspace System (NAS) to be conducted.

The AP/1B Pg. 1-4, item (19) says, “Unpublished towers found by surveys 200 feet AGL and above are in this SOP.” The Chart Update Manual (CHUM) is a living document that states, “all vertical obstructions 200 feet AGL and higher cannot be portrayed due to chart scale and feature density.”

Okay, what all this means is that all obstructions that I have to deal with are required to be lighted, right? Wrong: AC 70/7460-1K says “pilots of aircraft traveling at 165 knots or less should be able to see obstruction lights in sufficient time to avoid the structure by at least 2,000 feet horizontally under all conditions of operations, provided the pilot is operating in accordance with Federal Aviation Regulation (FAR) part 91.”

However, owners of obstructions may or may not be required to light the obstruction, based



on specific requirements in the AC. Painting of obstructions in either red and white checker pattern or aviation orange is expensive and is only *recommended* by the FAA. This requires increased vigilance on our part.

AC 70/7460-1K further states, "Construction or alteration of a structure that may affect the NAS is required under the provisions of 14 CFR part 77 to notify the FAA by completing the notice of proposed construction or alteration form (FAA Form 7460-1). This form may be downloaded from [www.faa.gov/ats/ata/ata400](http://www.faa.gov/ats/ata/ata400)." ACs may also be accessed and downloaded from this site. Lighting of obstructions above 200 feet AGL is not required, but is a normal operating practice. Obstructions within 20,000 feet of a runway and below 200 feet AGL may or may not be required to be lighted, based on a site survey conducted by the FAA.

## LIGHT FAILURES

What happens when a light on a lighted obstacle fails? AC 70/7460-1K states, "Light failures on obstructions should be corrected as soon as possible. Any failure or malfunction that lasts more than thirty minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to the nearest Flight Service Station (FSS) so a notice to airman (NOTAM) can be issued. Toll free numbers for FSS's are listed in most telephone books or on

the FAA's website." One of the problems we are dealing with is that ACs are not regulatory in nature, they merely describe an industry standard that is not a requirement unless directed by a governing body such as the FAA.

Obstructions that emit frequencies governed by the Federal Communications Commission (FCC) as stated in 47 CFR part 97, volume 5 part 80 to end, repeat what 14 CFR part 77 states. FCC forms, bulletins, and information can be obtained from the FCC's national call center at 1-888-call-FCC (1-888-225-5322).

## ARMY REQUIREMENTS

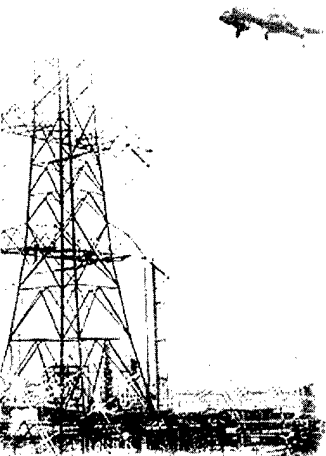
What does the Army require of me as an aviator? Army Regulation (AR) 385-95 Pg. 12 E. (4) requires Army Aviators to immediately report hazards and unsafe conditions or acts to the proper authority. After initial verbal report, we should provide a DA Form 2696 (OHR) to document the condition and promote follow-up actions as appropriate.

The FAA has a similar program known as the Aviation Safety Reporting System (ASRS). AR 385-95 Pg. 10 C. (4) says, "the Operations Officer will ensure a detailed hazard location map covering the entire unit operational area is posted and current." Page 24, 3-3 A & H state that the SOP will address "terrain flight hazard avoidance and operations in a tactical environment." We often train in alert areas and MOA's that are beyond the boundaries of our "base operations hazard map." So, we must be aware of the manner in which hazards are promulgated in all of our areas of operation, and ensure that we include these areas in our terrain flight hazard avoidance operations in a tactical environment.

## REAL HAZARDS

Why is all of this so important to Army aviation operations? Power companies frequently put up distribution and transmission lines to homes, businesses, and other facilities that are not in the proximity of an airport. Depending on the terrain, distribution lines average 40-60' AGL and transmission lines average 100-120' AGL. These obstructions are not reported unless they are in proximity to an airport. And, these obstructions may not be lighted—even if they are above 200 feet. It is important to note that "our" Military Operations Area (MOA), Alert Area, or area of operation (AO) is not really "our" airspace—it is the FAA's. An individual or small company may or may not know whom to report construction projects to or if he/she is required to report an obstruction. This fact has aircrews relying on FAR part 91 (see and avoid). Remember, not all obstructions will be reported or lighted.

I am not even attempting to address such areas as errors in publications, or problems with



proper and timely dissemination of new hazards. My aim is to make sure that now you are armed with a better education and awareness of the hazards that lie in waiting in the NAS.

## IMPROVE YOUR PROGRAM

How do I ensure my unit's terrain flight hazard avoidance program is the best it can be? My solution to this complex paradox of regulations and publications, that greatly relies on the human element, is to first set-up a working rapport with all cell phone, power, and construction companies in your local area and/or areas of operation. Second, give the information in this article to each of them (you

will more than likely find yourself educating these companies, as I did) along with the name and number of your Post Airspace Safety Office. Third, work with your Post Airspace Safety Office frequently in an effort to develop the best, most proactive terrain flight hazards avoidance program possible.

AR 385-95 states that your SOP will address terrain flight hazard avoidance, and operations in a tactical environment; how well and completely you apply process system safety management into your SOP is up to you and your organization.

—CW3 Jon Sturnick, ASO/IP, C-co, 1-14<sup>th</sup> AVN REGT, Ft Rucker, AL  
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## OFF DUTY

# Flu season

**Find out how you can beat the flu at its own game this season.**

**I**t all starts with a shiver. Within what seems like a matter of minutes, however, it's obvious that the chill has nothing to do with dropping temperatures. Instead, you're bundled up even in your heated home, teeth chattering, head pounding, and feeling like you've just been run over by a herd of hyena-chased elephants.

Congratulations—you're among the one in 10 Americans who can expect to get the flu this winter.

There's good reason why you aren't alone in your misery. As viruses go, few are as omnipotent as those in the influenza family. From the moment they enter the body—via another victim's misdirected cough or sneeze, or by hitching a ride from a doorknob, telephone receiver, or other object onto a hand and then into the moist nasal membranes—the invading marauders launch their all-out assault.

The first step is to find host cells ripe for the takeover. Since the flu virus can't replicate on its own, it needs to use the body's cells to manufacture new virus particles. Several hours later, several hundred new virus particles emerge from each now-destroyed host cell, ready to

seek new cells to invade. After a couple of days of such cellular invasions and replications, the virus particles will number in the billions.

While the body's own immune system will, in most cases, already have mounted its attack against the virus, you'll undoubtedly also be feeling the effects of the warfare taking place in your body. All that congestion in your heart and lungs? That's the dead cells and debris clogging your respiratory tract. The sore throat and tight chest? That's the viral attackers completely destroying parts of the protective cilia, or tiny hairs, lining the throat, windpipe and bronchi, consequently leaving the underlying membranes exposed and inflamed. And the throbbing headache, fever, and all-over soreness? That's just the effects of your immune system trying to oust the viral invader.

By the time you've felt your first shiver, however, some of these newly manufactured viruses have begun their exodus from your body and into other unsuspecting victims, ready to repeat the cycle. If you're like most sufferers, you'll feel the effects of the feud for only another five to seven days. However, there's a chance that other opportunistic invaders may take advantage of your worn-out immune system, leading to complications such as pneumonia or other bacterial infections. And while for most of us the flu is just a week or two of aches

and pains, for high-risk individuals (such as the elderly, newborns, or those with compromised immune systems or chronic medical conditions such as asthma or diabetes), a fight with the flu can turn out to be deadly.

## A SHOT IN THE ARM

Fortunately, there are ways to make your body an unappealing host to the flu virus. Your best defense is vaccination, which can lower your risk of infection by 70 percent to 90 percent and greatly reduce the severity if you do fall ill.

The trick to providing optimal immunity against the flu is in the timing. It takes 10 to 14 days for protection to start kicking in after

you get the shot, so if you wait too long, you may be exposed before you're fully protected. On the other hand, the defense begins to wane after several months, so if you get vaccinated too early, the protection may begin to subside before the flu virus leaves your area.

Because the influenza bug tends to make its first appearance in mid-December, give or take a few weeks, peaking around the end of January and disappearing by March, the optimal time to get vaccinated is generally October through mid-November. Around this time of year, most military treatment

facilities offer free flu shots on a walk-in basis (call your nearest facility to find out when the vaccine will be available), and many pharmacies and grocery stores also offer immunization typically at a cost of \$20 or less.

Historically, the flu vaccine has been so effective at reducing the risk and severity of illness that the Centers for Disease Control and Prevention (CDC) has this year for the first time, lowered the age at which it recommends

the vaccine, from 65 to 50 years. "A lot of people after age 50 begin to develop chronic conditions such as diabetes," says CDC spokesperson Kay Hoskins, "but don't normally get the flu shot. By lowering the recommended age, we hope that all those at risk {of complications} will get protected."

In addition to those over 50, the CDC also recommends vaccination for:

- Residents of nursing homes or chronic-care facilities;
- Those with chronic heart or lung disease, including asthma;
- Those with kidney or metabolic problems, such as diabetes;
- Anyone who has been treated for a blood disorder
- People whose immune systems are compromised, including those with HIV/AIDS or who are currently undergoing chemotherapy or radiation treatment;
- Children over six-months of age who are on long-term aspirin therapy;
- Women in the second or third trimester of pregnancy or those who are nursing;
- Doctors, nurses, other health care workers, family members, and anyone else who comes in close contact with high-risk individuals during the flu season; and
- Those traveling to foreign countries.

If the flu shot has such a great track record, why doesn't everybody get one? Availability, for one thing. Unlike vaccines for other diseases, such as measles and chicken pox, which provides decades-long or lifetime immunity, the flu vaccine must be given each year to provide protection against the constantly evolving strains.

The logistics of preparing enough vaccine each year for everyone, on the short notice required after the season's likely flu strains are identified, would be a nightmare. In addition, the vaccine potentially could be harmful for some, including women in their first trimester of pregnancy and people allergic to eggs or the preservative thimerosal (also found in most contact lens solutions).

And while some patients may develop a little soreness around the injection site, or even





develop a low-grade fever, fatigue, and muscle aches if they've never been exposed to the flu before, keep in mind that the vaccine can't give you influenza because it's made from an inactivated virus.

Of course, there are also some much more low-tech ways to protect yourself against the flu. One of the most effective is also one of the most time-tested: good old-fashioned hand washing. By regularly and diligently scrubbing with soap and warm water for at least 20 seconds, you can help keep the germs away. In addition, try to keep your hands away from your face, especially your nose and mouth, as much as possible to avoid giving the virus an easy entryway into your body. Don't forget that other factors, such as rest, moderate exercise, adequate water intake, and alcohol and tobacco abstention are important when it comes to keeping your immune system primed for fighting invaders. Too late?

So what if you've opted out of getting the vaccine this year, or you were the one of the 10 percent to 30 percent who got the flu even after getting immunized? This flu season, there may be help for severe cases of influenza, as well as for those at high risk of complications. Two new prescription antiviral drugs, zanamivir (sold under the brand name Relenza) and oseltamivir (sold under the brand name Tamiflu), were approved last year, joining the older antivirals, amantadine and rimantadine, which often had side effects worse than the flu symptoms. By interfering with a protein on the surface of the flu virus, zanamivir and oseltamivir prevent the virus from leaving an infected cell and attacking others.

Yet even such treatments don't offer complete relief. In a clinical trial, adults with the flu who took zanamivir felt better on average only one day sooner than those taking a placebo. Another study by John J. Treanor and colleagues at the University of Rochester, NY, showed that patients who received oseltamivir within 36 hours after initial flu symptoms recovered 30 percent faster than placebo-treated patients (70 hours of feeling crummy compared with 103 hours). And the cost? Approximately \$50 for a five-day supply. The trick is to start the

medicine within a day or two of the symptoms' onset—assuming you can muster the strength to get out of bed and to the doctor's office.

But the use of these new drugs may not be limited to treating the flu in motion. New research is showing they may also help to keep the virus at bay—much like vaccination. In clinical trials, zanamivir was found to be 84 percent effective in preventing the flu when taken once daily for four weeks during the flu season. In another study, oseltamivir reduced the incidence of disease by 74 percent when taken once or twice daily for six weeks. The use of these antivirals as preventative measures against the flu has previously been reserved for high-risk patients who could not be vaccinated due to allergies or other reasons.

The practicality of all this use for the general public, however, leaves much to be desired. First of all, the expense can be prohibitive for many people, plus the drugs must be taken every day. Pending Food and Drug Administration (FDA) approval for their preventative use, they may be called upon in the face of an epidemic—for those who have been exposed to the flu but didn't get vaccinated, and for those who are unable to get vaccinated but are at high risk of developing complications.

Still, because of concerns about misuse of antiviral drugs, the FDA has issued a public health advisory to medical professionals encouraging judicious use of the drugs in influenza patients and reminding practitioners that vaccination should be considered the primary method of preventing and controlling the flu.

Before prescribing these antivirals, physicians must be certain that the patient truly does have the influenza virus and does not have any underlying chronic medical conditions or other significant bacterial infections. Additionally, physicians must use special caution when prescribing zanamivir to patients with asthma or chronic obstructive pulmonary disease, since there have been reports of respiratory problems following inhalation of the drug.

## LAST MINUTE REMEDIES

Even if you opt to let the flu run its course,



there are things you can do to reduce your discomfort if you can't get to a flight surgeon straightaway.

■ Stay in bed. Not only will the rest help your body fight off the bug, but it also will keep you from spreading the flu to others.

■ Drink plenty of fluids, especially water, juice, and non-caffeinated drinks, to help replace fluids lost through the fever process and to keep the mucus in the respiratory tract thin and easy to clear.

■ Use a steam vaporizer to help clear out your congestion and make it easier to breathe.

■ Take aspirin (except in children, who may be at risk of developing Reyes syndrome), acetaminophen (such as Tylenol), or other over-the-counter pain relievers to take the edge off the aches and pains.

■ Try over-the-counter, alcohol-free medication, depending upon your symptoms, such as decongestant to help you breathe easier and prevent secondary ear or sinus infections or cough medicine to make you more comfortable.

**Remember, if you self medicate, you must inform a flight surgeon before beginning any**

## **flight duties.**

During your recovery, pay close attention to signs that your bout with the flu may be developing into something more serious. Signs that you may have developed a secondary bacterial infection include a very high fever (104 degrees Fahrenheit or greater) or the spiking of a fever after you felt you were recovering, chest pain associated with breathing, or a productive cough with thick, yellowish-green mucus.

Also, be on the alert for the pain of ear or sinus infections. If you have any heart or lung problems or chronic diseases or are otherwise on the list of those high-risk individuals for whom the flu shot is recommended, consult your flight surgeon as soon as you suspect you have the flu. By taking such precautions, you can avoid being one of the 100,000 Americans who likely will end up in the hospital this winter due to complications of the flu—or one of the 20,000 for whom the virus will prove to be fatal.

—reprinted from *The Retired Officer*. (The author is Karen Kopp DuTeil, with CMDR Gregory C. Utz, M.D., USN)

## **Is it a cold or the flu?**

| <b>Symptom</b>                  | <b>Flu</b>                     | <b>Cold</b>                             |
|---------------------------------|--------------------------------|---|
| <b>Fever:</b>                   | <b>102-104 degrees</b>         | <b>Rare</b>                             |
| <b>Headache:</b>                | <b>Usual</b>                   | <b>rare</b>                             |
| <b>General aches/pain:</b>      | <b>Usual, often severe</b>     | <b>Slight</b>                           |
| <b>Fatigue/weakness:</b>        | <b>Can last 2-3 weeks</b>      | <b>Mild</b>                             |
| <b>Extreme exhaustion:</b>      | <b>Early and usual</b>         | <b>Never</b>                            |
| <b>Stuffy nose:</b>             | <b>Sometimes</b>               | <b>Usual</b>                            |
| <b>Sneezing:</b>                | <b>Sometimes</b>               | <b>Usual</b>                            |
| <b>Sore throat:</b>             | <b>Sometimes</b>               | <b>Usual</b>                            |
| <b>Chest discomfort, cough:</b> | <b>Common; can be severe</b>   | <b>Mild to moderate Cough</b>           |
| <b>Complications:</b>           | <b>Bronchitis, pneumonia</b>   | <b>Sinus Congestion or earache</b>      |
| <b>Prevention:</b>              | <b>Vaccination, antivirals</b> | <b>None</b>                             |
| <b>Treatment:</b>               | <b>Antivirals</b>              | <b>Rest, over-the-counter medicines</b> |

# Avoiding Ice Fright

**A**n inadvertent encounter with icing conditions ranks right near the top of a pilot's worst fears. Even small ice accretions can decrease an airfoil's lift, increase drag, and cause dangerous drops in airspeed. That is why the cardinal rule of thumb is to take evasive action fast at the very first sign of airframe icing. Having ice-protection systems, or flying an airplane certified for flight in known icing conditions, can buy you some time to make your escape, but know this: Many airplanes with full complements of ice protection equipment and known icing certification have crashed after lingering too long in icing conditions,

## HOW IT HAPPENS.

A pilot receives a weather briefing mentioning the chance of icing conditions, or even reported icing conditions, and launches anyway.

Or a VFR-only, or even instrument rated, pilot continues flying into deteriorating weather, eventually runs into instrument meteorological conditions, flies into clouds, and ices up.

Icing related accidents closely resemble one of the biggest killers in general aviation — continued VFR flight into instrument weather. The antidote to these accidents? Maintain better than VFR separation minima.

## TYPES OF ICING

There are two basic types of icing—clear and rime. Clear ice occurs most often in the 0 to -10 degrees Celsius temperature range. As the name implies,

clear ice is a near coating over the airplane's leading edges. It's often found in cumulus clouds and unstable conditions. Rime ice usually lurks in stratoform clouds with temperatures between -10 and -20 degrees Celsius. It has a milky, pebbly appearance and usually shows up as a thin, white line on wing leading edges or other airframe protuberances, such as outside air temperature probes and antennas.

The icing process occurs when an airplane flies into clouds or precipitation composed of super-cooled water droplets. Super-cooled droplets are liquid but at freezing temperatures. They remain liquid until an airplane flies into them. Then they quickly freeze on impact with the leading edges. Rime ice is usually slower to build than clear ice.

## THE WORST OF THE WORST.

High on the danger scale is freezing rain (FZRA). It is a fast-forming type of clear ice that occurs primarily in advance of winter warm fronts. It's caused by rain, snow, or ice crystals falling through a warmer layer of air at lower altitudes. Very large droplets associated with this phenomenon run far back on airfoil surfaces and can quickly disrupt lift.

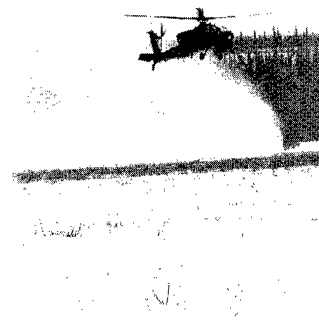
But as bad as freezing rain is, freezing drizzle (FZDZ) is worse. It is characterized not just by large super-cooled droplets, but also by its extremely high liquid water content. When freezing drizzle strikes an airplane, ice formations can become large and strangely shaped. Ridges of ice may form along the entire wingspan, causing aerodynamic havoc.

Freezing drizzle was studied heavily after the 1994 crash of an ATR-72 in Indiana. The National Transportation Safety Board (NTSB) in its final report

on the occurrence concluded that the aircraft experienced an uncommanded roll excursion and crashed during a rapid descent. The NTSB attributed the loss of control to a sudden and unexpected aileron hinge moment reversal that occurred after a ridge of ice accreted beyond the de-ice boots. Researchers determined that supercooled "drizzle drops" likely caused the ridges of ice to form aft of the de-ice boots. Freezing drizzle seems to occur most often in the Great Lakes and maritime regions, where the air in frontal systems can be loaded with huge amounts of liquid water. Results are pending from additional research, but the prevailing opinion these days is that freezing drizzle is predominantly a low-altitude phenomenon. The ATR's freezing drizzle encounters occurred between 10,000 and 8,000 feet MSL, when it descended in a holding pattern.

## ESCAPE STRATEGIES—

Viable strategies for escaping icing conditions depend on the conditions at hand. A descent to altitudes with warmer temperatures may solve the problem. A climb to on-top conditions can also do the trick if your airplane has the power to climb high enough and you're certain of the nearby cloud-top altitudes. Climbing through clouds in icing conditions carries a risk: If you spend too much time at climb angles of attack, you



could cause ice to form on the undersides of the wings and aft of any boot or bleed-air-protected leading edge wing panels. This is a sure-fire way to kill lift quickly, which is why some manufacturers publish minimum airspeeds for use when climbing in icing conditions.

Often, a 180-degree turn is the best idea. Presumably, you began your flight in ice-free conditions. A return to the areas behind you, then, ought to take you away from danger. What if icing conditions have closed in all around you?

A landing at the nearest airport—or a precautionary off-airport landing—is the best move.

The important thing is to have a preconceived idea in your mind as to what you'd do if you inadvertently encountered icing. If you can't come up with a satisfactory plan that has an extremely good chance of success, then the best strategy is not to fly at all.

## IF YOU GOT'EM, POP'EM

Pilots who fly airplanes equipped with inflatable de-ice boots should inflate those boots as soon as ice forms on wing leading edges. The timeworn advice was to allow a certain amount of ice to form before inflating the boots. That theory was motivated by the belief that cycling the boots too often would cause ice to make a shell-like formation beyond boot-inflation limits. Ice bridging, it was called.

The latest research indicates that ice bridging is a myth. It's true that more ice will shed if more ice is allowed to build on booted surfaces. But experts now say there's no reason to believe that ice can continue to form and bridge over leading edges and leave boots to helplessly pulsate behind an ever-growing sheath of ice.

## A DECISION TREE

Avoiding ice starts at the pre-flight planning stage.

**Pilots:** If you're not instrument-rated, fly only in VFR, ice-free conditions. Should the weather turn ugly, you must be proficient in the skills and procedures necessary to deal with ATC and perform climbing or descending turns solely by reference to instruments. Those with instruments ratings should be current and proficient in the basics of instrument flying should the need to shoot a tough instrument approach arise.

**The weather:** Flying in winter fronts is not a good idea in airplanes without certification for flight in known icing. Even with known ice certification, airplane performance can be crippled by a bout with severe icing.

During the pre-flight weather briefing, you're looking for above-freezing temperatures at or above any minimum en route altitudes (MEA). This way, should a descent be necessary, you'll lose any ice accretions on the way down. As for cloud tops, they should be low enough that your airplane can top them if a climb out of icing conditions is in order. Ideally, you should have scattered-to-broken cloud layers along your route of flight and plenty of holes to allow ice-free climbs and descents to your flight-planned altitudes—and to your destination airport. Extra

caution is called for at night: Icing and other clouds obviously can't be seen as well.

**The airplane:** Turbine powered airplanes seldom have trouble climbing to on-top conditions—as long as the climb is initiated quickly enough. In the clear air above, any ice accumulation that you picked up down below will take some time to sublime away (it could take hours) but at least you're not collecting any additional ice.

If you're in a piston-powered airplane with a comparatively low horsepower rating, your ability to climb out of ice is seriously compromised. So is your ability to overcome the drag caused by any ice you might pick up. These airplanes, though they may have heated pitot tubes and alternated engine air doors (tools that should be used on any airplane whenever flying in cloud or precipitation within the icing temperatures range) just aren't cut out for ice flying.

**Terrain:** Here the concern is flight over mountains and other high terrain. Icing is worse in the air currents over high terrain, and your ability to descend out of icing conditions is severely limited by high MEAs.

If any of the variables listed above raises any concern, your pre-flight decision tree has a shaky limb or two. You don't need to ground yourself every time clouds pop in a winter forecast, but you do need to look extra hard to determine if the trip is really critical or if any of the deciding factors raises any level of concern.

—Reprinted courtesy of AOPA pilot, all rights reserved. Author: Thomas A. Horne, (301) 695-2359, Tom.Horne@aopa.org

<http://www.aopa.org/asf/publications/sa11.html>  
[http://www.asy.faa.gov/safety\\_analysis/weather\\_study/](http://www.asy.faa.gov/safety_analysis/weather_study/)  
<http://www.nts.gov/>  
<http://www.crrel.usace.army.mil/>  
<http://icebox.grc.nasa.gov/>

# Final Exam on ICING

(More than one answer may apply.)

1. The first day of winter is?  
a. November 27  
b. December 21  
c. December 25  
d. I don't care; how many days until summer?

2. The following is not a requirement for structural icing in flight:  
a. flight through visible moisture  
b. high speed  
c. aircraft external surface temperature at or below freezing  
d. ambient air temperature a degree or two above freezing

3. Match the following definitions with the type of icing  
a. Rime  
b. Mixed  
c. Clear  
d. Cloudy

- 1 Hard, Glossy, and Heavy  
2 Brittle and Frost-like  
3 Hard Rough Conglomerate  
4 Not a Type of Icing

4. This is not a type of structural ice:  
a. cloudy  
b. clear  
c. rime  
d. mixed

5. Cloud factors affecting icing include:  
a. droplet size  
b. drop distribution  
c. aerodynamic effects of the aircraft  
d. all of the above

6. Icing is more hazardous in:  
a. flatland areas  
b. desert areas

- c. ocean areas  
d. mountainous areas

7. Icing can occur in which season?  
a. winter  
b. spring  
c. summer  
d. fall  
e. all of the above

8. Frost should be removed from an aircraft before flight  
a. sometimes  
b. never  
c. always  
d. only at gross weight

9. Stall speed and icing are:  
a. related  
b. not related  
c. somewhat related  
d. none of the above

10. Approach speed when iced up should be:  
a. adjusted as per the aircraft handbook  
b. decreased  
c. increased  
d. none of the above

11. A Convective SIGMET implies severe icing.  
☐ True  
☐ False

12. SIGMETs are issued for severe icing.  
☐ True  
☐ False

13. AIRMETS are issued for moderate icing.  
☐ True  
☐ False

14. When icing conditions are encountered, what action(s) should be taken?

- a. depart the area  
b. climb to above freezing temperature  
c. descend to above freezing temperature  
d. any one of the above, depending upon circumstances

15. Match the following PIREP icing terms with their respective definitions.

- a. Trace  
b. Light  
c. Moderate  
d. Severe

15-1. Ice becomes perceptible. Rate of accumulation is slightly greater than the rate of sublimation. It is not hazardous even though deicing/anti-icing equipment is not used unless encountered for an extended period of time (over 1 hour).

15-2. The rate of accumulation is such that deicing/anti-icing equipment fails to reduce or control the hazard. Immediate flight diversion is necessary.

15-3. The rate of accumulation is such that even short encounters become potentially hazardous and use of deicing/anti-icing equipment or flight diversion is necessary.

15-4. The rate of accumulation may create a problem if flight is prolonged in this environment (over 1 hour). Occasional use of deicing/anti-icing equipment removes/prevents accumulation. It does not present a problem if the deicing/anti-icing equipment is used.

Quiz courtesy of Roy Gambino, 1st Warrant Officer Company, WOCC, Fort Rucker, DSN 558-1485 (334) 255-1485  
Information sources: FAA's Aviation Weather (AC 00-6A) handbook and the FAA Airman's Information Manual (AIM). The answers include reference and location.

Answers: 1. b. December 21, 2. b. high speed, Weather, 92, 3. 3-1=c, 3-2=a, 3-3=b, and 3-4=d, Weather, 93, 4. a. cloudy, Weather, 92, 5. d. all of the above, Weather, 99, 6. d. mountainous areas, Weather, 102, 7. e. all of the above, Weather, 102, 8. c. always, Weather, 103, 9. a. related, Weather, 92, 10. a and c, adjusted per the handbook, or if no, information is provided, increased, Weather, 104, 11. True, AIM, Para. 7-5c5 Note, 12. True, AIM, Para. 7-5e, 13. True, AIM, Para. 7-5g, 14. d. Any one of the above, (Weather, 103/104, AIM, para. 7-20b.), 15. 15-1=a, 15-2=d, 15-3=c, 15-4=b, (AIM, Para. 7-20b.)

## Message update

MESSAGE DTG 161526Z Nov 00

AIG 12197

MACOMS

SAILE

DACS-SF

### SUBJECT: ARMY ACCIDENT REPORTING AND RECORDS

A. AR 385-40, Accident Reporting and Records, 1 November 1994

B. DODI 6055.7, Accident Investigation, Reporting, and Record Keeping, 3 October 2000

1. Reference A provides Army policy and procedures on Army accident classification, notification, investigation, reporting, record keeping, and implements related DOD requirements.

2. Reference B recently revised DOD accident investigation, reporting, and record keeping requirements. A revision of AR 385-40 will be coordinated and published IAW Army publications procedures. Until publication of the revised AR 385-40, requirements in Reference A remain applicable Armywide.

3. The following clarifies the AR 385-40 requirement that all training-related deaths be investigated.

a. Training-related deaths are deaths associated with a non-combat military exercise or training activity that is designed to develop a military member's physical ability or to maintain or increase individual/collective combat and/or peacekeeping skills, and, occurs during or within one hour after such training activity.

b. Training-related deaths occurring during or within one hour after any training activity will immediately be reported to USASC Operations DSN 558-2660/3410 or commercial 334-255-2660/3410 (para 3-2, AR 385-40).

c. If the training-related death is not selected by the Director of Army Safety for central accident investigation (para 1-4b, AR 385-40), a MACOM or installation level investigation will be conducted to determine cause of accident and identify controls that if applied would reduce the risk of further accidents or deaths.

d. Training-related deaths determined to result from natural causes will not be classified by USASC as Class A Army accidents (para 2-7i, AR 385-40). Training-related deaths determined to be Army accidents will be classified by USASC as Class A Army accidents.

—Fran Weaver, Safety and Occupational Health Manager, Policy and Programs, USASC, DSN 558-1141, (334) 255-1141, email [weaverf@safetycenter.army.mil](mailto:weaverf@safetycenter.army.mil).

## How to get Flightfax

If you're reading this, you're probably okay. But if you have had problems getting Flightfax, get too many copies, not enough copies, etc., here's a suggestion. Contact Sharrel Forehand, publications distribution manager at the US Army Safety Center. Phone her at DSN 558-2062 or e-mail [forehans@safetycenter.army.mil](mailto:forehans@safetycenter.army.mil). She can help with Countermeasure distribution as well. And don't forget, you can always download Flightfax and Countermeasure from the Safety Center website: <http://safety.army.mil>

# ASO List Server 2000

The Army Safety Officer e-mail list server is being transferred from the Pentagon to the Safety Center. The Safety Center will operate and maintain the server beginning January 2001.

## To SUBSCRIBE:

■ Step 1: Address your request to [listserv@safetycenter.army.mil](mailto:listserv@safetycenter.army.mil)

■ Step 2: Send your request containing your personal information, typed exactly this way  
Subscribe "ASOlistserver"

[Johnd@1/4cav.army.mil](mailto:Johnd@1/4cav.army.mil) (CW3 John Doe, ASO, HHT, 1-4 Cav, 363-331-5555)

After you complete step 2, the computer will notify you by e-mail that you are added to the list. You will also receive the rules of engagement (ROE). At this point you may discard the e-mail address used in step 1; you won't use it again.

Step 3: Address all traffic for the listserv to:  
[ASOlistserver@safetycenter.army.mil](mailto:ASOlistserver@safetycenter.army.mil)

## IMPORTANT NOTES:

■ You must have a .mil or .gov address to subscribe.

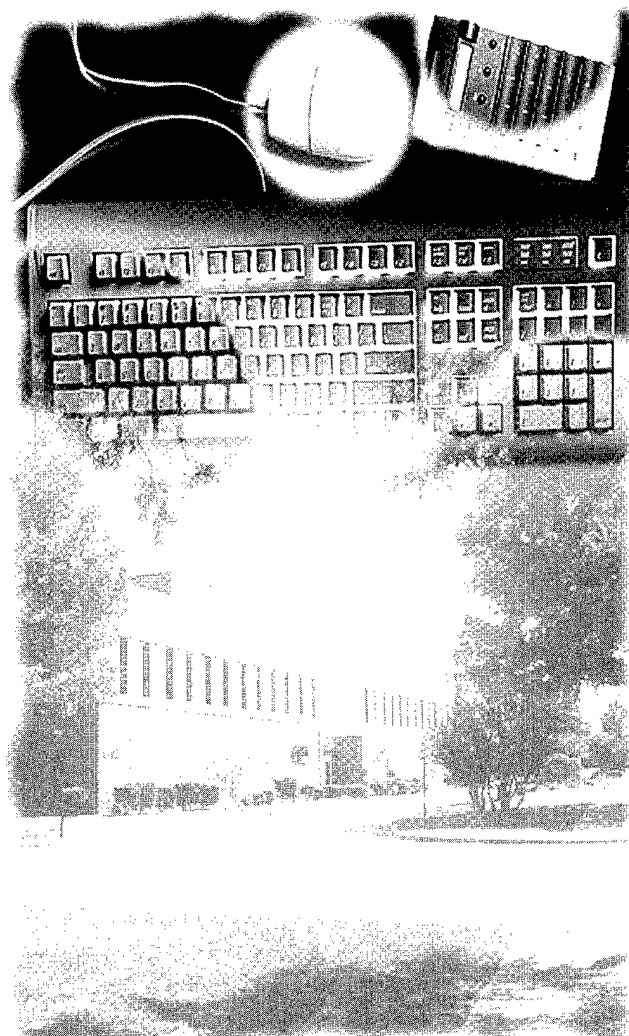
■ The subscription address is not the address you will use for normal message traffic.

■ Maximum file capacity for the list is 4 megabytes.

*Warning: Violations of the ROE, posting inappropriate or sensitive information, will result in the termination of your subscription.*

—CW3 D. Smith, US Army Safety Center, DSN 558-3712, (334) 255-3712, [smithd@safetycenter.army.mil](mailto:smithd@safetycenter.army.mil)

—Mr. Lee Helbig, USASC, DSN 558-9868 (334) 255-9868, [helbigl@safetycenter.army.mil](mailto:helbigl@safetycenter.army.mil)



## Logistics conference set for Feb 01

The 2001 Worldwide Aviation logistics conference and product support symposium is set for 20-23 February 2001 at Redstone Arsenal's Sparkman Center auditorium, Huntsville, Alabama. Lodging rooms have been set aside at the Huntsville Hilton, 800-455-8667. To facilitate badging and parking, Redstone Arsenal requests that prospective attendees register before 27 January with the Aviation and Missile Command at DSN 897-1476, (256) 313-1476, e-mail [Patricia.Hopkins@redstone.army.mil](mailto:Patricia.Hopkins@redstone.army.mil)

Contact Kimberley Daniel (256) 464-9191, [Daniel\\_Kimberley@aepco.com](mailto:Daniel_Kimberley@aepco.com) for conference registration and other information. 31 Jan is the deadline to avoid late fees.

# Accident briefs

Information based on preliminary reports of aircraft accidents

## AH1



### Class E

#### F series

■ While conducting armament systems operational check during engine run-up, the gun elevation stow light would not illuminate. Upon further inspection, the turret was found to be non-responsive to HSS or TSU commands.

## AH64



### Class C

#### A series

■ During a thru-flight inspection following an uneventful flight, the aircrew found the No.1 engine cowling open. Initial inspection revealed no apparent damage and the engine cowling was secured. After completion of the thru-flight inspection, the aircraft was flown an additional 0.7 hours. During the post-flight inspection, damage to the inside of the No.1 engine cowling was found. Maintenance and safety personnel were notified and the aircraft was secured.

### Class E

#### A series

■ While OGE at 80-120 feet AGL, attempting to land, aircraft experienced No.1 and No.2 engine/main rotor droop. While attempting to land at aircraft parking, the aircraft immediately began to descend downward and forward. In the effort to avoid hitting parking pad revetments and one parked UH-60, the pilot on the controls maneuvered the aircraft to an open area between two parking pads. As a result, the aircraft landed in the mud on a significant slope between an empty parking pad and one occupied by the UH-60. UHF antenna sustained superficial damage upon landing. Maintenance inspection revealed the No.2 engine alternator was out of specifications. Alternator was replaced. After exhaustive inspections and a comprehensive test flight no other malfunctions were found; the aircraft was released for flight.

■ During taxi, oil bypass utility hydraulic filter light illuminated. Aircraft was shutdown without further incident. Replaced utility filter button.

■ During engine shutdown, aft droop stop would not fully engage. Required high pressure water spray from fire engine to move droop stop into place.

#### D series

■ During aircraft run-up with just the APU in operation, the crew noticed a strong electrical burning odor in both crew stations. Earlier the aircrew had experienced trouble starting the APU. They decided to shutdown the APU and cancel the flight. Maintenance trouble shooting could not determine an APU or an electrical fault. Aircraft was released for flight.

■ During run-up, TADS FLIR video center 30% was blank in Night Vision System and sight select TADS in all fields of view. Replaced Night Sight assembly.

■ During run-up, TADS malfunctioned. Aircraft was shutdown without further incident. Mission aborted. Replaced night sight assembly.

## C12



### Class C

#### D series

■ While in cruise flight with the ice vanes extended, the PC placed the ice vane control switch in the retract position to retract the ice vanes. During retraction, the left ice vane fail segment light illuminated followed by illumination of the right ice vane fail segment light. The PC re-extended the ice vanes and attempted to retract them once again with the same results. The crew experienced difficulty with the manual operation of the ice vanes while carrying out the procedures in the -10 checklist for ice vane failure. Postflight inspection revealed damage to both vane actuators and one manual override assembly.

#### T series

■ Aircraft struck birds shortly after breaking out of clouds while on final

approach for landing. Damage to right side leading edge of stabilator.

### Class E

#### N series

■ After completing a visual approach to airport on a routine training flight, the crew taxied to the airfield FBO for refuel. The ramp was full and the crew waited for ground assist personnel for parking assistance. Ground personnel arrived on a tug and signaled for the aircraft to follow to alternate refueling parking. While following ground crew personnel to parking the aircraft's left wing tip struck the side-view mirror of a parked fuel truck. The aircrew shutdown the aircraft immediately. Damage to the left wingtip pod and navigation light.

## CH47



### Class E

#### D series

■ On final approach to landing zone with an external training block, the forward r/h sling leg separated from the load. Upon arriving at the landing zone, the load was released normally. Aircraft was landed without further incident. Investigation found that the grab hook keeper bent and allowed the chain to release from the grab hook.

## OH58



### Class C

#### D series

■ Collective was reportedly not lowered in time after completing autorotation. Excessive coning and subsequent flapping of main rotor blades resulted in damage to 4 main rotor blades and 2 droop stops.

#### D(r) series

■ NP limits were exceeded during FADEC manual throttle operations.

### Class E

#### D (I)

■ After successful mass mounted sight run-up, MMS made uncommanded 180 degree turn and



slewed skyward. MMS would not respond to Line of Sight Inputs and failed to stow. Replaced Mast Mounted Sight System Processor.

#### D (R)

■ During contour flight, aircraft's low oil quantity engine caution message displayed momentarily, so the crew began a turn back towards home station. Approximately one minute later, the low oil quantity engine message displayed steadily. The crew landed without incident. Maintenance inspection found no packing on the lower engine chip detector. It is suspected it was pinched/cut during installation and failed under pressure. Replaced packing, aircraft released for flight.

# UH60



#### Class C

■ While performing hoist operations in the mountains, aircraft struck a tree and sustained damage to main rotor tip caps. Aircraft began to vibrate and was landed without further incident.

#### K series

■ During a port-to-starboard approach, aircraft's tailwheel and left stabilator contacted shipboard components adjacent to flight deck of carrier.

#### L series

■ Aircraft overshot intended landing area and struck a dirt berm during a terrain flight approach into a dusty,

confined landing zone. Poor illumination due to overcast conditions created poor ground contrast during the approach. Aircraft landed on a downward slope and was unable to arrest forward motion prior to striking the berm. Aircraft was immediately brought to a hover to stop forward movement after contact with berm.

#### Class C

##### A series

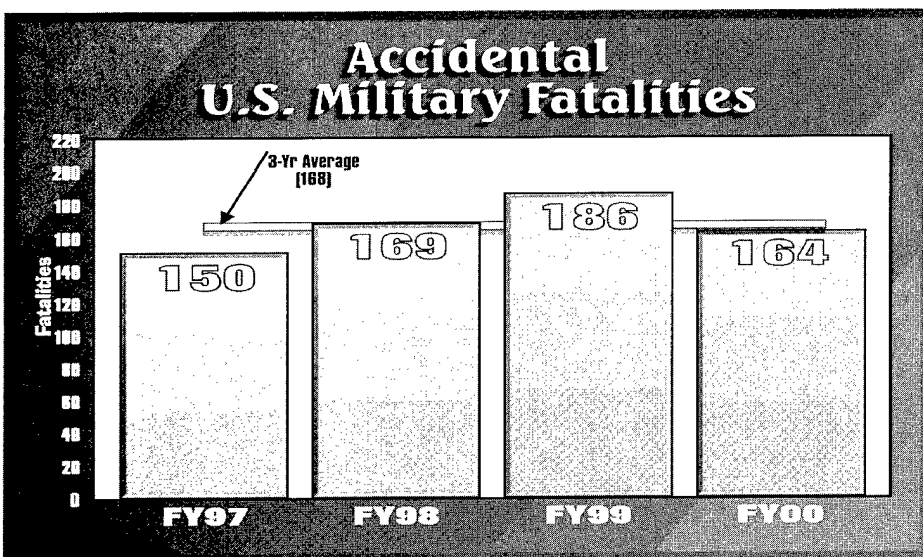
■ Main rotor blades were flapping up and down excessively during engine start. Immediate shutdown was performed. Investigation revealed black main rotor blade inside anti-dash flap bracket was broken off and red main rotor blade anti-dash flap bracket was bent. Spindle damage also suspected.

#### Class E

##### A series

■ During flight, crew and passengers detected what appeared to be smell of burning plastic. Ten minutes later, the aircraft's HSI began to spin continuously for three minutes. The anti-torque pedals made uncommanded movements right and left and the FPS caution light illuminated with the following capsule lights, RGYR, GYRO, and SAS 2. Crew returned to airfield without further incident. Maintenance personnel replaced the SAS/FPS computer and displacement gyroscope as fair wear and tear items. Aircraft released for flight.

For more information on selected accident briefs, call DSN 558-9855 (334-255-9855). Note: Information published in this section is based on preliminary mishap reports submitted by units and is subject to change.



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## Flightfax



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